

## OBSERVATIONS ON SOME AUSTRALIAN FOREST INSECTS

## 26. SOME INSECTS ATTACKING THREE IMPORTANT TREE SPECIES

by K. M. MOORE

Forestry Commission of New South Wales.

(Figures 1-2.)

## INTRODUCTION

Of the various eucalypt tree species of economic importance occurring along the coast and the eastern slopes of the Great Dividing Range in New South Wales, and which are valued as a source of timber scantlings, the species *Eucalyptus pilularis* Smith (blackbutt) is in considerable demand for building purposes. Another species, *E. grandis* Smith (flooded gum), has also attained a similar economic status by virtue of its quick growth, straight stems, and the relative ease with which the timber can be worked for mouldings, etc.; a third timber type, *E. saligna* Smith (Sydney blue gum), is also regarded as a prime timber species.

Planned timber-stand-improvement in forest management favours these three species where they occur, and during recent years, the two former species have been extensively sown or planted in provenance trial plots in many areas, from seed obtained in various localities between Eden, in New South Wales, to Fraser Id. in Queensland.

Sowing and planting techniques for *E. pilularis* and *E. grandis* are recorded by Hurditch (1968).

Information concerning the complex of insect species which attack these three relatively important *Eucalyptus* spp. is limited, and investigations have been made over a number of years to determine the insect species causing damage to them.

This list, although by no means comprehensive, provides a basis for more intensive studies on any of these insects.

*E. grandis* and *E. saligna* are species of close affinities, and many of the insects attacking one of these species also appear to attack the other. A number of insects attack all three species, and further observations will probably increase that number.

Some insects associated with, but not necessarily attacking, *E. saligna* were previously recorded (Moore 1961).

About 180 species are presented here, in the alphabetical sequence of the relevant insect Orders, and the three host plant species are denoted by the following lettering:- g = *Eucalyptus grandis*; p = *E. pilularis*; s = *E. saligna*.

Those insects known to attack other host species, are prefixed with an asterisk, and that portion of the tree where damage occurs, is recorded.

## COLEOPTERA

(Species of the Families Anobiidae, Bostrychidae, Brentidae, Buprestidae, Cerambycidae, Curculionidae and Lyctidae all appear to attack logs and unhealthy or dead or dying trees, unless recorded otherwise).

## ANOBIIDAE (furniture borers)

\**Derophtinus granicollis* Lea s

## BOSTRYCHIDAE (shot-hole borers)

\**Bostrychoplites cylindricus* (Macleay) s

\**Xylion collaris* Erichson s

\**Xylopsocus gibbicollis* Macleay s

## BRENTHIDAE

- \**Cyphagogus bipunctatus* Senna s  
*C. delicatus* Lea s

## BUPRESTIDAE (flat-headed borers)

- Nascio vetusta* Boisd. s

## CERAMBYCIDAE (longicorn borers) (see also Duffy, 1963)

- \**Bimia bicolor* White s  
 \**Coptocercus aberrans* Newm. s  
 \**C. biguttatus* (Don.) s  
 \**C. rubripes* (Boisd.) s  
*Demonassa dichotomia* Newm. (also in green stumps) s  
 \**Epithora dorsalis* Macl. s  
*Hesthesis cingulata* (Kirby) (kills young plants; see Moore 1966) p  
*Macrones rufus* Saund. s  
 \**Phoracantha recurva* Newm. s  
 \**P. semipunctata* (F.) (see Moore 1963a) p g s  
 \**Tessaromma undatum* Newm. g s  
 \**Tryphocaria acanthocera* (Macl.) g s  
 \**T. solida* Blkb. g s

## CHRYSOMELIDAE (leaf-beetles)

- (The species recorded here, attack young foliage)  
*Chrysophtharta cloelia* Stål. g  
*Edusella* nr. *glabra* p  
 \**Monolepta australis* (Jac) p  
*Paropsis maculata* Marsh. p  
*Paropsis* sp. p

## CURCULIONIDAE (weevils)

- Aterpus cultratus* F. (young shoots on twigs & branches) s  
 \**Chrysolophus spectabilis* (F.) (foliage) p  
*Euops* sp. (foliage) g s  
 \**Gonipterus scutellatus* (Gyll.) (foliage) s  
*G. exaratus* Fhs. (foliage) s  
 \**Platypus australis* Frogg. s  
 \**P. incomptus* Schedl p  
*P. queenslandi* Schedl s  
*P. semigranosus* Sampson s  
*Protopalus* sp. (branches) s  
*Prypnus squamosus* Blkb. (young foliage) p  
*Rhinaria concavirostris* Lea (young twigs) s  
*Xyleborus compressus* Lea g s  
 \**X. pseudoangustatus* Schedl s  
*X. similis* Ferr. s  
*X. solidus* Eichh. s  
 \**X. truncatus* Er. p s

## EUMOLPIDAE

- Edusella ?distincta* (Blkb.) (young foliage) p  
*E. nr. glabra* Blkb. (young foliage) p  
*Odontionopa viridula* Er. (young foliage) p

## LYCTIDAE (powder-post borers)

- \**Lyctus brunneus* (Steph.) s

## SCARABAEIDAE

- Diphucephala richmondia* Macl. (young foliage) p  
*Liparetrus discipennis* Guer. (young foliage) p

## DIPTERA

## THEREVIDAE

- ? (said to deposit eggs under bark of logs) p  
 ? (forms primary galls at tips of young shoots, & on leaves & petioles) g

## HEMIPTERA

## ACHILIDAE

*Tropiphlepsia ?badia* Muir s

## ALEYRODIDAE (white-flies)

\*? *Neomaskellia eucalypti* Dumbleton (foliage) g s

## APHIDIDAE (plant lice)

\**Aphis gossypii* Glov. (young foliage) g

## CICADELLIDAE

\**Cicadella angustata* (Evans) (foliage) g

*Erythroneura* sp. (foliage) g

*Idiocerus* sp. (foliage) g

\**Natipo rubrivenosa* (Kirk.) (foliage & twigs) p

*Nirvana adelaidea* Evans (foliage & twigs) g

*Putoniessa maculata* Evans (foliage & twigs) s

*Smicrocotis siduica* Kirk. (foliage) s

*Tartessus flavipes* Spanberg (foliage & twigs) p g

*T. fulvus* (Walk.) (foliage & twigs) s

## COREIDAE

*Amorbus rubiginosus* Guer. (kills young shoots) p

## DIASPIDIDAE

*Chrysomphalus trifasciculatus* Brimblecombe (on bark) s

\**Lindingaspis* sp. (foliage) g

## ERIOCOCCIDAE

*Apiomorpha* nr. *minor* (Frogg.) (twigs) p

\**Apiomorpha* sp. (twigs & crown) s

?*Maskellia* sp. (twigs) s

\**Eriococcus coriaceus* (Mask.) (twigs & leaves) p s

\**Opisthoscelis* sp. (twigs) g

## EURYBRACHYIDAE

*Platybrachys decemmacula* (Walk.) (twigs) s

## EURYMELIDAE

*Eurymela fenestrata* L. & S. (twigs & stems) s

*Eurymeloides bicincta* (Er.) (twigs & stems) p

*E. pulchra* Sign. (twigs & stems) s

## MEMBRACIDAE

*Acanthlucius trispinifer* Fairmaire (young twigs) g

## PSEUDOCOCCIDAE (mealy-bugs)

*Monophlebulus pilosior* (Mask.) (under bark) s

*Nodulicoccus* nr. *levis* (Mask.) (on stems) p g s

"*Pseudococcus*" *casuarinae* Mask. (under bark, stems) g s

*Puto gisleni* Oss. s

Gen. et sp. indet. (under flocculence, stems) s

## PSYLLIDAE (jumping plant lice)

(All except *Phellopsylla* attack foliage)

\**Cardiaspina fiscella* Taylor (see Taylor 1962) g s

*C. maniformis* Taylor g

*Creiis corniculata* (Frogg.) s

\**Glycaspis baileyi* Moore (see Moore 1961a, 1961b) s

*G. cyta* Moore p

\**G. granulata* (Frogg.) g s

*G. hirsuta* (Frogg.) p

*G. seriata* Moore p

\**G. ?planitecta* Moore p

*Spondyliaspis* sp. s

*Phellopsylla ?formicosa* Frogg. (under bark, stems) p s

*Psylla* sp. (severely curl young leaves) p g s

## RICANIIDAE

\**Scolypopa australis* Walk. (foliage & twigs) g

## HYMENOPTERA

## CHALCIDOIDEA

? (in gall-forming complex, twigs) s

## EURYTOMIDAE

? (in gall-forming complex, twigs) s

## PERGIDAE (saw-flies)

\**Perga dorsalis* Leach (foliage) g

\**Pergagraptia hackeri* Benson (see Benson 1940) (foliage) g

*P. polita* Leach (foliage) g

\**Polyclonus atratus* Kirby (see Moore 1957) (foliage on ground) g s

## TENTHREDINIDAE (saw-flies)

\**Phylacteophaga froggatti* Rick (miner in foliage) g s

\**Pterygophorus* sp. p

## TORYMIDAE

*Epimegastigmus* sp. (in gall-forming complex) g

*Megastigmus maritimus* Grlt. s

## ISOPTERA

## RHINOTERMITIDAE

\**Coptotermes acinaciformis* (Frogg.) p

\**C. frenchi* Hill p

\**C. lacteus* (Frogg.) p s

\**Schedorhinotermes intermedius* (Hill) s

## LEPIDOPTERA

## COSSIDAE

*Xyleutes magnifica* Roths. s

A number of species of the family Cossidae damage the stems of small or large trees of *Eucalyptus* spp., and *X. magnifica* is apparently the largest of these species. The damage caused by their larvae (Fig. 1) has been found in stems of large trees of *E. saligna* from 1' to 6' above ground-level.

Near the base of the damaged area, a small round hole about 10 mm. to 15 mm. in diameter through the bark, is kept covered with webbing, excreta and pieces of wood and bark, by the larva. A red staining of the bark occurs downwards from the lower edge of the hole. Externally, the bark surface appears to be intact until the larva is almost ready to pupate, but before pupation, most of the bark covering the damaged sapwood is removed by the larva.

By the time the larva has reached a late stage of development, an elongate exit hole somewhat like a large keyhole, leads inwards from the sapwood to the round larval tunnel which extends upwards for about 10" in the true-wood. An extensive and irregular area of the surrounding sapwood is also excavated, and the surface of this area is blackened and covered with a moist, slimy substance, prior to removal of the outer bark by the larva.

After pupation, the pupa appears to remain at the upper extremity of the round tunnel, facing downwards.

A considerable quantity of a fine, white mealy substance occurs externally on the pupa, and also on the adult specimen after it has emerged. A pupa, cut from the damaged area on a large tree of *E. saligna* on 19 November, emerged as an adult on 28 November.

## ELACHISTIDAE or YPONOMEUTIDAE

? p g s

(This species has been called the "sinuate borer", because of the typical damage of larvae in the sapwood of living trees).

During this project, no adults of this species were reared, even though the species is widespread, and of common occurrence on a number of host

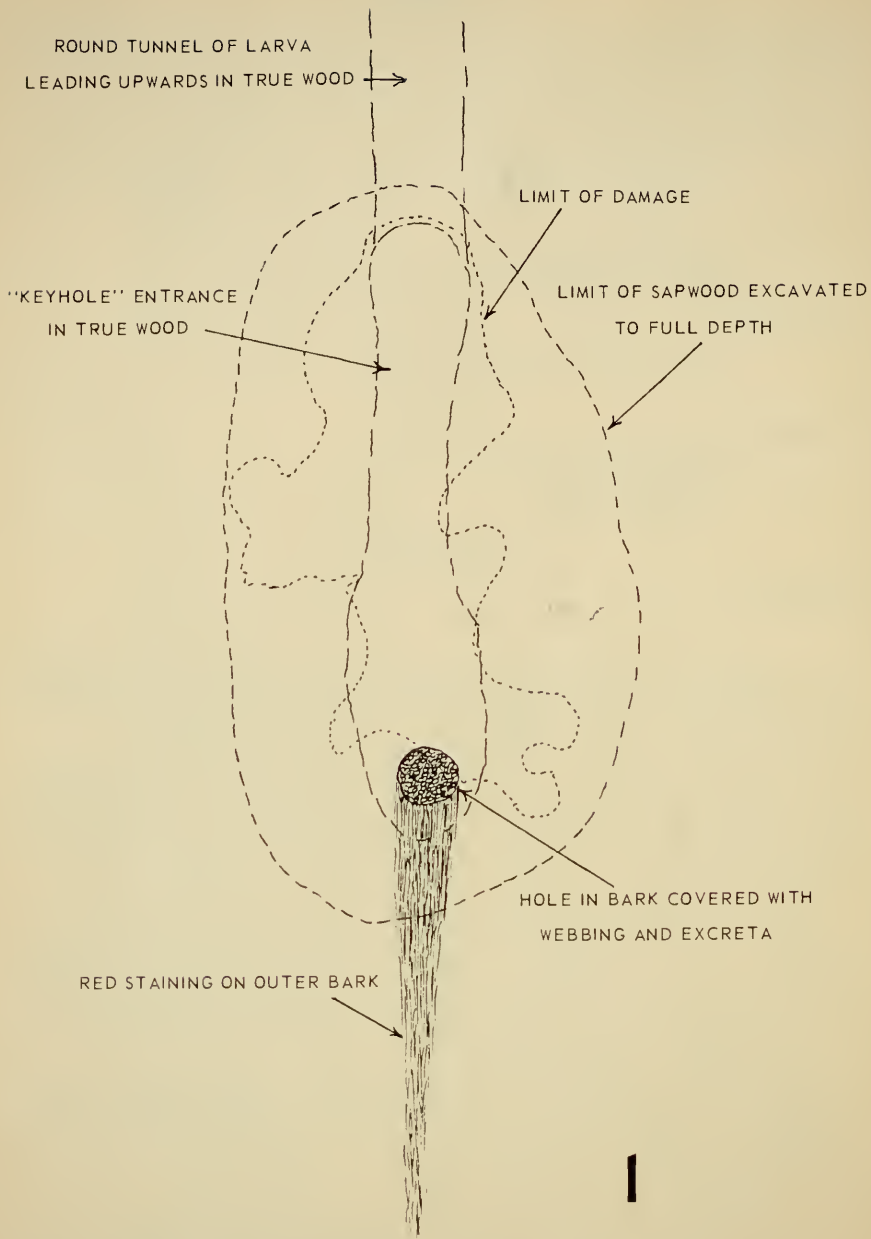


Figure 1.—Damage of larva of *Xyleutes magnifica* Roths. to stem of a large tree of *Eucalyptus saligna* Smith.



eucalypts. Until adults are obtained, an identification of the species cannot be given, but some of its biology is recorded here.

Almost all *Eucalyptus* spp. occurring in the eastern highlands and coastal areas of New South Wales appear to be attacked, presumably by the one species of borer, and *Angophora floribunda* is also its host.

Some of the habits of this species were determined from numerous trees of various ages, felled during several months.

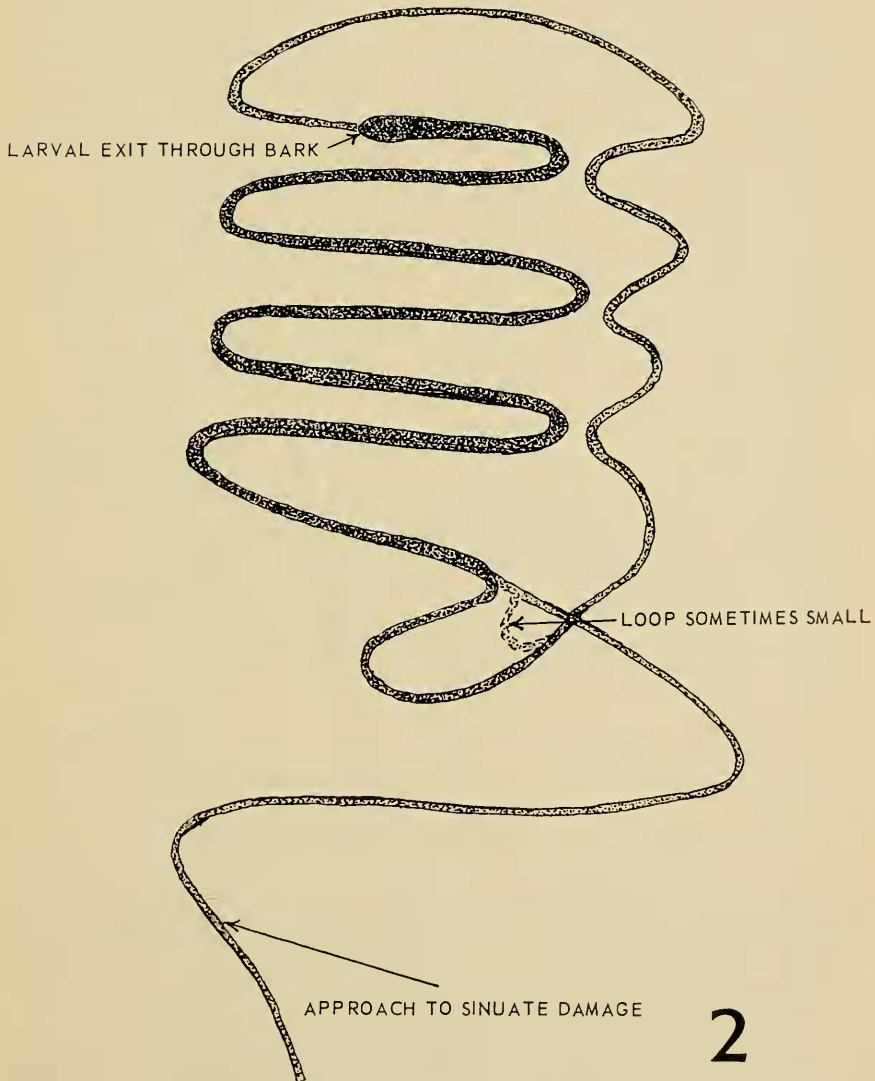


Figure 2.—Damage of larva of "sinuate borer" to the sapwood of a tree of *Eucalyptus saligna* Smith.

Oviposition by the adults, which apparently frequent the tree-crown area, occurs in the smaller twigs of about 6 mm. to 8 mm. in diameter, during the months of October to December, and by late March, some larval workings may reach to ground-level. Larval channels may thus exceed 70 feet in length, before the sinuate damage, typical of the late instar larvae, is formed.

Larvae of early instars superficially resemble nematodes. After being almost colourless during early instars and creamy-white during later instars, larvae eventually become dark grey in colour. Last instar larvae may attain a length of about 20 mm. prior to their emergence through the bark to pupate. An orange coloured dorso-lateral mark occurs each side of abdominal segment 5 on some larvae. Early instar larvae possess a flattened head-capsule similar to some leaf-miners of the family Gracilariidae (see Moore 1963), but the head capsules of late instar larvae are more rounded and similar in shape to those of most typical lepidopterous larvae.

Until the late instars, larvae tunnel below the surface cells of the outer layer of the sapwood, and are apparently continuously surrounded by the moisture which is translocated to the crown from the root system.

The tunnelling of the early instars is nearly always visible as a thin, pale brown line immediately below the tissues of the sapwood surface, when bark is removed. The tunnelling is sometimes in a more or less straight line, but at times it may become tortuous. From the twigs of the tree-crowns, larvae have been traced to ground-level before they turn upward again to construct the typical sinuate damage of the late instar larvae. Areas of sinuate damage (Fig. 2) have occurred at heights varying from 3' to 25' above ground-level. This type of damage is produced only by the last or penultimate instar larvae.

The sinuate damage is commenced as the larva channels upward, and may be commenced from a "left hand" or a "right hand" approach. It appears to be dependent on the "left hand" or "right hand" approach to the initial construction of the sinuate portion, as to which side of the sinuate portion the larva eventually proceeds downwards, on completion of that portion. The original approach channel to the sinuate area is then located and crossed by the larva. In each instance observed, the approach channel is first crossed, and then re-entered, before the larva proceeds to enlarge the sinuate portion further. The sinuate channel then becomes packed with coarse, dark excreta, and the inner tissues of the bark are also excavated, so that the outer bark surface of smooth-barked trees eventually bears the mark of the sinuate portion of damage constructed some years previously. The shape of the sinuate portion is more or less constant, irrespective of the tree-species on which it occurs.

During the enlarging of the sinuate channel, larvae emerge through a narrow vertical slot cut through the bark at a location above the lower half of the sinuate portion. The bark surrounding the slot, later turns brown in colour.

No correlation of the sinuate area with bark thickness, height above ground-level, or any particular segment of the tree stem was made.

On a tree 50' in height and 11" diameter-at-breast-height, a larva emerging through the bark during September, was obtained, and several other specimens had commenced the "repeat" tunnelling and enlarging of the sinuate area. The larva was placed in a glass jar containing soil and debris, together with a piece of sapwood leaning at an angle from the base to the top of the jar. The larva continually moved around in the jar, and granules of the sandy soil readily adhered to it, until it became almost immobilised.

When it was evident that the adherence of the soil was detrimental to the larva, the soil was removed from it with a sable-hair brush. The soil and debris were also removed from the jar and replaced with a large piece of smooth, fresh bark of *E. saligna*. The larva then commenced to construct its cocoon on the bark surface, but the elongate, greyish cocoon was not completed before the larva died.

From these observations it may be inferred that larvae avoid contact with soil, and possibly move upward from the emergence slot through the bark of the stem, towards the tree-crown area to pupate.

Sacking bands were attached at various heights to three trees, but no larvae pupated in them.

Attack has been correlated with trees of *E. saligna* severely damaged by fire some 8 years previous to the attack studied, and to plantations of *E. grandis* growing beyond the areas of its natural occurrence.

#### EUPTEROTIDAE

\**Panacela lewinae* Lewin (see Moore 1963b) (foliage) p g s

#### GELECHIIDAE

*Protolechia chalazodes* Turner (leaf-tier) s

\**P. mesochra* (Lower) (leaf-tier) p g s

*Protolechia* sp. (leaf-tier) g

#### GEOMETRIDAE

\**Ectropis rufibrunnea* Warren (foliage) g

\**Lophodes sinistraria* Guen. (foliage) s

\**Mnesampela privata* Guen. (foliage) p g s

\**Pingasa bryophylla* Goldfinch (foliage) p g

*Poecilasthenia thalassius* Meyr. (foliage) g

#### GRACILARIIDAE

\**Acrocercops calicella* (Stainton) (see Moore 1966a) (leaf-miner) s

*A. hoplocala* (Meyr.) (leaf-miner) s

\**A. laciniella* (Meyr.) (leaf-miner) p s

\**Parectopa ida* (Meyr.) (leaf-miner) s

#### HELIOZELIDAE

\**Heliozela prodela* Meyr. (leaf-miner) p g s

#### HEPIALIDAE

\**Aenetus eximius* (Scott) (stem borer) p g

\**A. lignivorus* (Lew.) (stem borer) g

*Perissectis australasiae* Don. (roots of young plants) g

*Zelotypia stacyi* Scott (stem borer) g s

Gen. et sp. indet. (in stems of large trees) s

#### INCURVARIIDAE

\*"*Tinea*" *nectarea* Meyr. (leaf-miner) p g s

"*Tinea*" sp. (*spodina* group) (leaf-miner) s

\*"*Tinea*" sp. nr. *spodina* (leaf-miner) p s

#### LASIOCAMPIDAE

\**Entometa fervens* Walk. (foliage) s

#### LIMACODIDAE

*Anapaea trigona* Turn. (foliage of large trees) s

\**Doratifera casta* Scott (foliage) p s

*D. oxleyi* Newm. (foliage) s

\**D. quadriguttata* (Walk.) (foliage) p s

\**D. vulnerans* (Lewin) (foliage) p g s

#### LYMANTRIIDAE

\**Axiologa pura* Lucas (foliage) p s

#### LYONETHIDAE

\**Hieroxestis omoscopa* Meyr. (see Moore 1959) (fallen leaves) g

#### NEPTICULIDAE

\**Nepticula* sp. No. 1 (leaf-miner) g s

\**Nepticula* sp. No. 2 (leaf-miner) p g s

\**Nepticula* sp. No. 3 (leaf-miner) p s

\**Nepticula* sp. No. 4 (leaf-miner) p s

\**Nepticula* sp. No. 5 (leaf-miner) p

#### NOLIDAE

\**Uraba lugens* Walk. (see Campbell 1962) (foliage) g



## OECOPHORIDAE

- \**Barea banausa* (Meyr.) (see Moore 1959) (rotting wood) s  
 \**B. confusella* (Walk.) (rotting wood) p  
 \**B. consignatella* Walk. (rotting wood) s  
 \**B. turbatella* (Walk.) (rotting wood) s  
 \**Eupselia* nr. *carpocapsella* Walk. (leaf-miner) p s  
*Notodryas aerea* Meyr. (leaf-tier) p

## PSYCHIDAE

- \**Clania ignobilis* (Walk.) (foliage) p  
 \**Hyalarcta huebneri* (Westw.) (see Moore 1963c) (foliage) p s  
 \**H. nigrescens* (Doubt.) (foliage) p  
 \**Narycia* sp. (foliage) p  
 \**Trigonocyttara clandestina* Turn. p s

## SATURNIIDAE

- \**Antheraea eucalypti* Scott (foliage) p

## SPHINGIDAE

- Metamimas australasiae* Don. (foliage) s

## TINEIDAE

- Tinea diaphora* Meyr. (under bark) s

## TORTRICIDAE

- Acroclita* nr. *perspectana* Walk. (associated with stem-galls) s  
*Acropolitis hedista* (Turn.) (foliage) p  
 \**Cryptoptila immersana* (Walk.) (foliage) g  
*Eboda exeristis* Meyr. (see Common 1965) (leaf-tier) g  
 \**Epiphyas xyloides* (Meyr.) (leaf-tier) p g  
 \**Isotenes miserana* (Walk.) (foliage) p g  
*Spilonota macropetana* Meyr. (foliage) p  
*Thrinophora tetrica* Turn. (foliage) p

## XYLORYCTIDAE

- Cryptophasa balteata* (Walk.) (stem borer) s  
*Illidgea epigramma* Meyr. (stem borer) s  
 Gen. et sp. indet. (stem borer) g

## ORTHOPTERA

## PHASMATIDAE

- \**Extatosoma tiaratum* (Macl.) (foliage) p

## TETTIGONIIDAE

- \**Caedicia congrua* (Walk.) (foliage) p  
*Paragryllacris ?combusta* Germ. (Predatory on large larvae of wood borers) p g s

## THYSANOPTERA

## THRIPIDAE

- \**Australothrips bicolor* Bagnall (foliage) s

During these observations, a phytophagous fungus was found to attack the leaves of young plants, and the species was identified as:-

*Botrytis* sp. g

It was also determined that wallabies ate the young growing tips of small plants, and broke many stems. Damage appeared to be most severe in open areas, where the plants were not competing with weeds and other growth. It appeared that seedlings among the cover of other plants were masked from such heavy attack.

## ACKNOWLEDGEMENTS

Identifications of the insects referred to in this paper were made by staff of:- The Australian Museum, Sydney; The British Museum, (Nat. Hist.), London; C.S.I.R.O., Canberra; Department of Primary Industries, Brisbane, Queensland; The Waite Agricultural Research Institute, Adelaide, South Australia; and Dr. J. W. Evans of Sydney and Dr. Karl Schedl of Austria.

## REFERENCES

- Benson, R. B., 1940.—A Revision of the Australian Sawflies of the Genus *Perga* Leach sens. lat. Hymenoptera: Symphyta, *Aust. Zool.*, 9:324-357.
- Campbell, K. G., 1962.—The Biology of *Roeselia lugens* (Walk.), the Gum-leaf Skeletonizer Moth, with Particular Reference to the *Eucalyptus camaldulensis* Dehn. (River Red Gum) Forests of the Murray Valley Region. *Proc. Linn. Soc. N.S.W.*, 87(3):316-338.
- Common, I. F. B., 1965.—A Revision of the Australian Tortricini, Schoenotenini, and Chlidanotini (Lepidoptera: Tortricidae: Tortricinae). *Aust. J. Zool.*, 13:613-726.
- Duffy, E. A. J., 1963.—A Monograph of the Immature Stages of Australian Timber Beetles (Cerambycidae). Trustees, British Museum, London.
- Hurditch, W. E., 1968.—Raising Blackbutt Seedlings on the North Coast. *Forest & Timber*, 5(3):8-9 (March).
- Moore, K. M., 1957.—Notes on the Biology of the Sawfly *Polyclonus atratus* Kirby 1882 (Family Pergidae, Subfamily Euryinae), and Some of its Parasites. *Proc. Roy. Zool. Soc. N.S.W.*, pp. 74-81.
- (1959).—The Biology and Larval Taxonomy of Some Lepidoptera Attacking Trees and Timber. *Aust. Zool.*, 12(4):337-350.
- 1961.—Insects Associated With *Eucalyptus saligna*, *E. acmenioides* and *Angophora intermedia*. *Proc. Roy. Zool. Soc. N.S.W.*, pp. 87-95.
- 1961a.—The Significance of the *Glycaspis* spp. (Homoptera: Psyllidae) Associations With Their *Eucalyptus* spp. Hosts; Erection of a New Subgenus and Descriptions of Thirty-eight New Species of *Glycaspis*. *Proc. Linn. Soc. N.S.W.*, 86(1):128-167.
- 1961b.—The Biology and Occurrence of *Glycaspis baileyi* Moore in New South Wales. *Proc. Linn. Soc. N.S.W.*, 86(2):185-200.
- 1963.—Two Species of Lepidopterous Leafminers Attacking *Eucalyptus pilularis* Smith. *Aust. Zool.*, 13(1):46-53.
- 1963a.—Some Mortality Factors of *Phoracantha semipunctata* (F.) (Coleoptera: Cerambycidae). *Proc. Linn. Soc. N.S.W.*, 88(2):221-229.
- 1963b.—An Indigenous Insect, *Panacela lewiniae* (Lewin) (Lepidoptera: Eupterotidae) Attacking Exotic *Pinus* spp. in New South Wales. *Aust. Zool.*, 13(1):40-45.
- 1963c.—Lepidoptera Attacking *Pinus* spp. in New South Wales. *Proc. Linn. Soc. N.S.W.*, 88(3):340-360.
- 1966.—*Hesthesis cingulata* (Kirby) (Coleoptera: Cerambycidae) Attacking Young Plants of *Eucalyptus pilularis* Smith. *Aust. Zool.*, 13(3):299-301.
- 1966a.—Notes on Some Australian Leaf-miners. *Aust. Zool.*, 13(4):303-349.
- Taylor, K. L., 1962.—The Australian Genera *Cardiaspina* Crawford and *Hyalinaspis* Taylor (Homoptera: Psyllidae). *Aust. J. Zool.*, 10(2):307-348.